Chapter 10: The human nervous system

Knowledge organiser

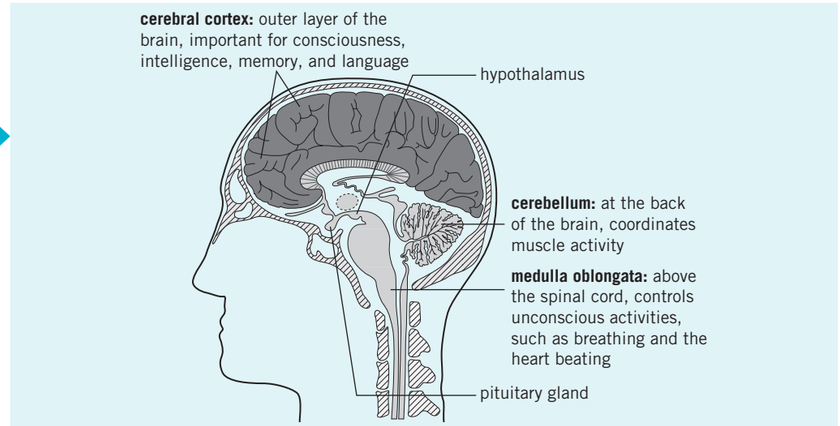
Nervous system responses

Stimulus	Receptor	Coordinator	Effector	Response
a change in the environment (**stimulus**) is detected by **receptors**	information from receptors passes along cells (**neurones**) to the CNS as electrical impulses	the CNS coordinates the body's response to the stimulus	effectors bring about a response, such as glands secreting hormones or muscles contracting	the body responds to the stimulus

The brain

The brain controls complex behaviour.

It is made of billions of interconnected neurones, with different regions that carry out different functions.



Accommodation

Accommodation is the process of changing the shape of the lens to focus on near or distant objects.

To focus on a *near* object

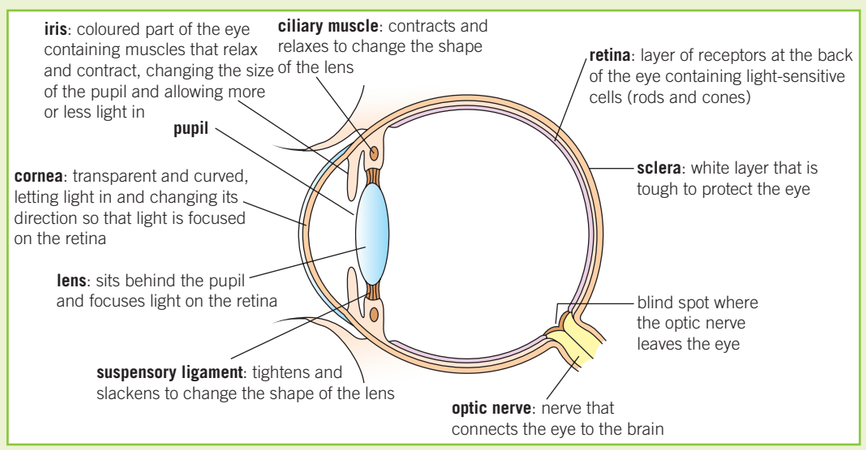
- ciliary muscles *contract*
- suspensory ligaments are slack
- so lens is thicker and more curved, and refracts light rays more strongly.

To focus on a *distant* object

- ciliary muscles relax
- suspensory ligaments are pulled tight
- so lens is thinner and flatter, and only refracts light rays slightly.

Structure of the eye

The eye is a **sense organ** containing **receptors** sensitive to light intensity and colour.

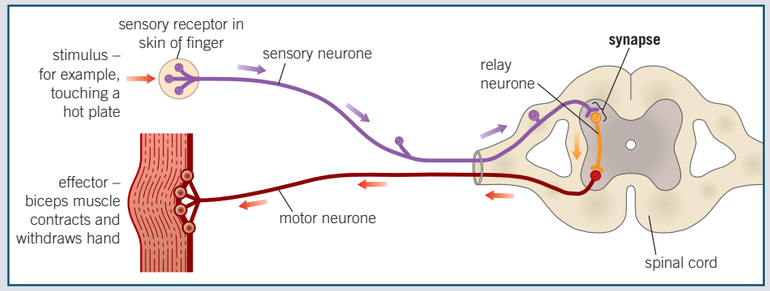


Reflex arcs

The nervous system is made up of the **central nervous system** (CNS) and a network of nerves. The CNS comprises the brain and spinal cord.

Reflex actions of the nervous system are automatic and rapid – they do not involve the conscious part of the brain.

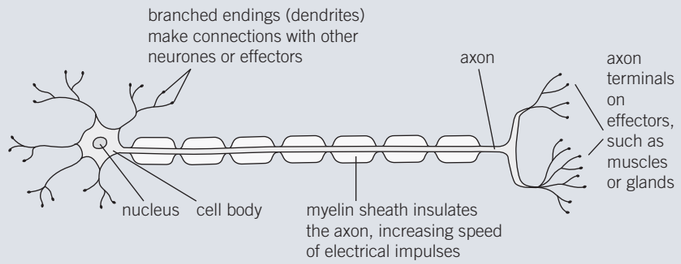
Reflex actions are important for survival because they help prevent damage to the body.



Reflex arc structures

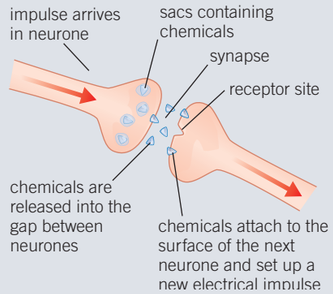
Neurones

Neurones carry electrical impulses around the body – relay neurones connect sensory neurones to motor neurones



Synapses

Synapses are gaps between neurones, which allow electrical impulses in the nervous system to cross between neurones



Research on the brain (HT only)

Neuroscientists have mapped the regions of the brain to particular functions by studying patients with brain damage, using MRI scanning techniques, and electrically stimulating parts of the brain.

The brain is very complex and delicate, making investigating and treating brain disorders difficult.

Brain damage and diseases can involve many different neurones, chemicals, and areas of the brain. Treatment is difficult because

- it is not fully understood what each area of the brain does
- drugs do not always reach the brain through its membranes
- surgery can easily cause unintended damage.

Common defects of the eyes

Myopia

Short-sightedness, when distant objects look blurred because rays of light focus in front of the retina.

This is corrected using **concave** spectacle lenses.

Hyperopia

Long-sightedness, when near objects look blurred because rays of light focus behind the retina.

This is corrected using **convex** spectacle lenses.

Treatment of eye defects

- spectacle lenses to refract light rays to focus on the retina
- hard and soft contact lenses – like traditional glasses, but on the surface of the eye
- laser eye surgery – to change the shape of the cornea
- replacement lenses – adding another lens inside the eye to correct defects permanently.

Key terms

Make sure you can write a definition for these key terms.

brain, central nervous system, concave, convex, effectors, hyperopia, involuntary, myopia, neurones, receptors, reflex action, spinal cord, stimulus, synapse

Chapter 10: The human nervous system

Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

B10 questions	Answers
1 What is the function of the nervous system?	it enables organisms to react to their surroundings and coordinates behaviour
2 What are the two parts of the central nervous system?	brain and spinal cord
3 Why are reflex actions described as rapid and automatic?	they do not involve the conscious part of the brain
4 Why are reflex actions important?	for survival and to prevent damage to the body
5 Give the pathway of a nervous response.	stimulus → receptor → coordinator → effector → response
6 Give the function of the cerebral cortex.	outer layer of the brain playing an important role in consciousness
7 Give the function of the medulla oblongata.	part of the brain above the spinal cord that controls breathing and heart rate
8 Give the function of the cerebellum.	part at the back of the brain involved in coordinating muscle activity
9 Why is it difficult to treat brain disorders?	brain is very complex and delicate
10 What is a synapse?	gap between two neurones, allowing impulses to cross
11 What is the function of neurones?	carry electrical impulses around the body
12 What is accommodation?	process of changing the shape of the lens to focus on near/distant objects
13 Give two common defects of the eyes.	myopia (short-sightedness) and hyperopia (long-sightedness)
14 How can eye defects be treated?	spectacle lenses, contact lenses, laser surgery, and replacement lenses in the eye

Put paper here